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ORIGINAL ARTICLE

Some Haematological Parameters in Women on Different Types of Contraceptives Attending Specialist Hospital, Sokoto, Sokoto State, Nigeria

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Abstract

Background: Haematological parameters are measurable indices of blood that can be used to identify and monitor some pathological and physiological abnormalities. Contraceptive use is one of the factors that affect these parameters.

Objective: This study was aimed to assess some haematological parameters (total white blood cell count (WBC), lymphocyte count (Lymph), mixed cell count (MID), Neutrophils (Neut), red blood cell count (RBC), haemoglobin concentration (Hgb), haematocrit (HCT), platelets count (PLT), mean platelets volume (MPV), platelets distribution weight (PDW), plateletcrits (PCT), and platelets large cell ratio (P-LCR)) of women using different types of contraceptives attending family planning Clinic of Specialist Hospital Sokoto, Sokoto State, Nigeria.

Materials and Methods: This was a case-control study. Which involved a total of 76 subjects; 51 were women on different types of contraceptives, and 25 were women not on any contraceptives. Those using implants were 24, injectable were 14, IUCD were 6 and oral pills were 7. Blood samples were collected and analyzed using a Sysmex haematology analyzer. Data were analyzed using statistical software package for social science (SPSS) version 20.0, expressed as Mean ± standard deviation (SD) and analyzed using student's t-test and one-way ANOVA.

Results: There were significant decreases in values of WBC, NEUT and PCT of the test subject when compared with control (p=0.02), (p=0.04) and (p=0.02) respectively. Meanwhile, there were no significant differences in the values of Lymph, mid, RBC, Hgb, HCT, PCT, MPV, PDW and P-LCR in test subjects when compared with control (p≥0.05). The study showed a significant decrease in PCT of those using pills, injectables, intrauterine contraceptive devices (IUCD) and implants (p=0.04). Also, Significant differences in WBC, Lymph and MID were observed among the Yoruba, Nupe and Igbo tribes that participated in the study (P=0.02) (P=0.00) and (P=0.01), respectively.

Conclusion: The study has shown that WBC, NEUT and PCT are

reduced in those using contraceptives. This can lead to a reduced immune system, exposure to infections and haemostatic disorders. Therefore, there is a need to monitor the haematological parameters of those on contraceptives to avoid adverse haematological effects.

Keywords: Haematological Parameters, Women, Contraceptives, Sokoto, Nigeria.

Introduction

Haematological parameters are measurable indices of blood that can be used to identify and monitor some pathological and physiological abnormalities (1). These blood components originate from the haematopoitic stem cell of the bone marrow. The assessment of haematological parameters is essential because they are important indicators useful in assessing immunity, therapeutic purposes, monitoring disease progression, and treatment outcomes for proper patient management. The developmental stages of life vary directly with basic biological variables of age and sex independently. In pursuant of effective health care through accurate diagnosis, haematological parameters are routinely assessed (1). Haematological parameters (Haemoglobin concentration, Packed Cell Volume, Red Blood Cell count, Total and differential white blood cell count, platelets count and it's indices are influenced by various factors such as age, gender, diet, genetic, medications and chemicals. Blood constituents change in relation to the physiological and pathological status of the body. These changes are important in assessing the body's response to various physiological situations like contraceptives (2).

Contraception involves all actions aimed at either preventing fertilization of the gametes or implantation of the zygote. It is immaterial whether the means of doing so are traditional or orthodox or even whether they are effective or not (3). It essentially refers to practices that help individuals or couples to attain the objectives of avoiding unwanted births, bring about wanted births, regulate intervals between pregnancies, control the time at which births occur in relation to the ages of the parents and to determine the number of children in the family (4). There are lots of evidences on the benefits of family planning (5). The main aim of family planning is to improve the populace's quality of life. Family planning empowers women and is a proven and cost-effective health intervention (5). It can reduce up to 32% of all maternal deaths and nearly 10% of childhood deaths if it were readily available (3).

Family planning directly reduces the number of maternal deaths because it reduces the chance of pregnancy and its associated complications. Furthermore, it lowers the risk of having an unsafe abortion for unintended pregnancy, delays first pregnancy in young women who might have premature pelvic development, and reduces hazards of frailty from high parity and closely spaced pregnancies (6). Contraception has the potential to ensure optimum spacing between successive pregnancies thereby improving perinatal infant, and child health (7). Evidence shows that, in developing countries, when conception occurs within six months of a previous birth the risk of prematurity and low birth weight doubles (6). Contraception improves health and economic and social outcomes for women and their families, and it positively impacts public and environmental health (7). Reports suggest that contraception

has been a contributor to halving the number of maternal deaths worldwide between 1990 and 2010. For example, East Asia has made the maximum advancement in preventing maternal deaths and has a contraceptive frequency rate of 84%; in contrast, sub-Saharan Africa, which has the highest rates of maternal death, has an average contraceptive prevalence rate (CPR) of 22% (6).

There are different methods of contraception including the use of; implants, intra uterine contraceptive device (IUCD), injectable contraceptives, combined oral contraceptive pills, progesterone only pill (POP). Other methods include the barrier method, which has to do with the use of male and female condoms and permanent contraception, for example, vasectomy and tubal ligation (8). Comparing the effectiveness of different methods of contraception, with the exception of vasectomy and tubal ligation, IUCD and implant are the most effective, followed by injectable, COCP, POP and the rest. However, each method is associated with its own advantages and disadvantages (8). Despite the general acceptability, and the obvious advantages that have been attributed to oral contraceptive use, some serious side effects have been reported in women taking the pills. Epidemiologic studies have indicated a relationship between oral contraceptive use, platelet changes and thromboembolic phenomenon (9).

Packed cell volume, platelet count, erythrocyte deformability, plasma fibrinogen concentration, and plasma and whole-blood viscosity vary cyclically throughout the menstrual cycle in the non-users of hormonal contraceptives. This variation is abolished by the use of oral contraceptives, and the values of these indices are raised by an amount likely to predispose to thrombosis (10).

Platelets and total leukocyte count are the determinants of coagulation and inflammation respectively. Both of these parameters are the markers for atherosclerotic cardiovascular disease. Inflammation plays a major role in the pathophysiological mechanism of atherosclerosis and cardiovascular disease. Specifically, an elevated white blood cell (WBC) count is a risk factor for atherosclerotic vascular disease, which may be associated with the use of some methods of contraception. Therefore, the association of leukocyte count with cardiovascular risk factors may represent a chance of subclinical disease, or alternatively, leukocyte count could be part of a chain leading to atherosclerosis (11). When the relationship between platelet count, total leukocyte counts and platelet aggregation was reviewed it was found that, white blood cell count, platelet count, mean platelet volume can lead to raised platelet aggregation (12).

Some of the women who practice contraception experience no side-effects at all, while some of them experience side-effects such as spotting or breakthrough bleeding (BTB), nausea, headache, breast tenderness, weight gain, mood changes, low libido, and dermatologic problems. Mild and transitory disturbances are common in the first cycles of hormonal contraception and usually disappear after this period, without any problem. However, these side effects might have a direct or indirect relation with changes or alterations in haematological parameters (13).

Hormonal contraceptives are often associated with side effects commonly; nausea, headache, breast tenderness, weight gain, irregular bleeding and mood changes (14). Oral pills are the most frequently used hormonal contraceptives and commonly contribute to increased blood pressure, blood clots, heart attack and stroke. In Europe and North America, studies have demonstrated that

estrogen/progestogen oral contraceptives are associated with myocardial infarction, thromboembolism and stroke commonly among women over the age of 35 and smokers (14). In southwest Nigeria, it was reported that the awareness of contraceptives and family planning continues to be on the rise with urban and educated residents than rural dwellers (15). Progesterone only hormonal preparations are associated with predisposition to higher risk of thromboembolism with reports of involvement of platelets. The menstrual irregularities were found to be more frequent in users of injectable hormonal contraceptives than in non-users, especially amenorrhea and irregularities of menstrual flow. Use of hormonal contraceptives was associated with better haematologic profile whereas IUCDs were found to pose risk of anaemia in a low socio-economic group (13).

Different methods of contraceptives have different side effects on different women, this was why this was set out to evaluate the effects of the different methods of contraceptives on some haematological parameters in women using different methods of contraceptives. The study by Etor and Alozie in Rivers state reported that socio-demographic characteristics such as age, parity, mother's education and spouse education influence the resumption of sexual activities and the use of contraceptives post-partum (16). Several studies have been conducted on the use of contraceptives in Sokoto (17), but none was done to assess haematological parameters of those on contraceptives in Sokoto. Therefore, there is paucity of data on haematological parameters of those using contraceptives in Sokoto. No wonder, this study was aimed at assessing some haematological parameters of women using different types of contraceptives attending Specialist hospital, Sokoto, Sokoto state, Nigeria. The study will show the effect of contraceptives on haematological parameters of the study participants and compared with control. Data generated in this study will offer information on the haematological parameters of the participants, changes that occur and possibly prevent anaemia and other haematological-related disorders associated with the use of contraceptives.

Materials and Methods

Study Area

The study was conducted in Fertility Research unit, family planning clinic in the Department of Obstetrics and Gynecology (O and G) of Specialist Hospital, Sokoto. Sokoto state is located in the extreme north-west of Nigeria. The state is bounded in the north by the Niger Republic, Kebbi state to the southwest and to the east by Zamfara state. The state is within the Sahel savannah region of sub-Sahara Africa. Report from the 2006 National census indicated that the state had a population of 3,696,999 people. The estimated population of the state for the year 2021 is 5,354,356 people (18).

Study Design

The study was a case-control study.

Sample Size Determination

Sample size was calculated using G-power 3.0 software with large effect size, 95% confidence level and power of 0.95 which gives a total of 76 (51 subjects and 25 controls).

Study Population

Seventy-six (76) samples were used for the study, 51 subjects were recruited from the family planning clinic of Specialist Hospital, Sokoto. Those using implants were 24, injectable were 14, IUCD were 6 and oral pills were 7. While 25 controls were apparently healthy women of child bearing age who are not on contraception.

Inclusion Criteria

Women attending the family planning clinic of Specialist Hospital, Sokoto who agreed to participate in the study using any contraceptive method except the use of physical barriers (condom, vaginal ring).

Exclusion Criteria

The following women were excluded from the research: Women on physical barrier method and those who refused to give informed consent to participate in the study.

Ethical Consideration

The ethical approval was obtained from Ethics Committee of Specialist Hospital, Sokoto with reference number (SHS/SUB/133/VOL.I).

Informed Consent

Written and informed consent was sought and obtained from each of the participants.

Questionnaire

All consenting participants were administered a semi-structured interviewer questionnaire to obtain information on the subject's age, gender, family history, ethnicity, and type of contraceptive use.

Sample Collection

Three milliliters (3ml) of blood were collected by venipuncture from each subject and control using a vacuum needle into an Ethylene Diamine Tetra-Acetic Acid (EDTA) vacuum container under aseptic conditions. The blood was gently inverted 5-6 times to mix it with the anticoagulant and prevent clotting. The collected samples were analyzed in the Haematology Department of the Specialist Hospital in Sokoto.

Sample Analysis

Assay of Full Blood Count Using Sysmex Three Parts Haematology Analyser

The samples were analyzed using Sysmex haematology analyser. The machine is a Three-part autoanalyser able to test 19 parameters per sample, including RBC count, Haemoglobin concentration, Haematocrit (Hct), Total White Blood Cells and 3-differentials, Platelets counts, Platelets indices and other related parameters.

Principle of the machine

The automated cell counter samples the blood and quantifies, classifies, and describes cell populations using electrical and optical techniques. Electrical analysis involves passing a dilute blood solution through an aperture where an electrical current flows. The passage of cells through the current changes the impedance between the terminals (the Coulter principle). A lytic reagent is added to the blood solution to selectively lyse the red cells (RBCs), leaving only white cells (WBCs), and platelets intact. Then, the solution is passed through a second detector. This allows the counts of RBCs, WBCs, and platelets to be obtained. Due to their lower cell volumes, the platelet count is easily separated from the WBC count by the smaller impedance spikes they produce in the detector. Optical detection may be utilized to gain a differential count of the populations of white cell types. A dilute suspension of cells is passed through a flow cell, which passes cells one at a time through a capillary tube past a laser beam. The reflectance, transmission and scattering of light from each cell is analyzed by sophisticated software giving a numerical representation of the likely overall distribution of cell populations.

Statistical Analysis

The data collected was analyzed using a statistical software package for social science (SPSS) version 20.0, and the results obtained

were presented in tables in the form of Mean ± standard deviation (SD). Comparison between the subjects and controls was carried out using student's t-test. Comparisons of variables obtained among women on different methods of contraception and different sociodemographic factors were made using analysis of variance (ANOVA). p-value < 0.05 was considered statistically significant.

Results

A total number of seventy-six (76) participants were recruited for this study; these participants were women of childbearing age (16-45). Among them, fifty-one (51) were the test subjects using different methods of contraceptives and twenty-five (25) were control group. Out of these 51 test subjects twenty-four (24) make use of implants, fourteen (14) make use of injectables, six (6) use IUCD and the remaining seven (7) are on oral pills. The ethnicity of the test subjects was 67%, 23%, 4%, 2%, and 4% for Hausa, Fulani, Yoruba, Nupe and Igbo respectively. The educational status of the test subjects was 37%, 18%, 31%, and 14% for Islamiyya, Primary, Secondary, and Tertiary respectively. While their occupational status was 2% employed, 2% self-employed, and 96% were housewives. (Table 1).

Table 2 compares test subjects' and controls' haematological values (mean ± S.D). There were significant decreases in values of WBC, Neut and PCT of the test subject when compared with control in values of (p=0.02), (p=0.04) and (p=0.02) respectively. Meanwhile, there were no significant differences in the values of Lymph, mid, RBC, Hgb, HCT, PCT, MPV, PDW and P-LCR in test subjects when compared with control (p≥0.05).

Table 3 shows the comparison of some haematological values (mean ± S.D) of test subjects on different methods of contraceptives. There were no significant differences in WBC, lymph, MID, Neut, RBC, Hgb and HCT on different types of contraceptives (p≥ 0.05). There were no significant differences in PLT, MPV, PDW and P-LCR values among different contraceptives (p≥ 0.05). Meanwhile, PCT showed a significant decrease from pills, injectables, IUCD and implants (p=0.04). (i.e. those using implants have lower PCT, and those on pills have higher PCT).

T**able 4** compares some haematological values of test subjects based on age distribution. The study indicates no significant difference in the study variables between individuals using contraceptives in different age groups (p≥0.05).

Table 5 compares some haematological values of test subjects based on educational status. This study indicates that there were no significant differences in the study variables between individuals using contraceptives at different educational levels (p≥0.05).

Table 6 compares some haematological values of test subjects based on occupation. There were no significant differences between individuals using contraceptives in different occupations (p≥0.05).

Table 7 shows the comparison of some haematological values of test subjects based on tribe

The study showed significant differences in WBC, Lymph, and MID when compared across the different tribes (p=0.02), (p=0.00), and (p=0.01), respectively. There were no significant differences between the total platelet count and platelet indices in women on contraceptives when compared across tribes (p ≥0.05).

Table 1: Summary of sociodemographic factors of test subjects

Parameters		Test Subjects
Methods of contra-ceptives used	Implants Injectables IUCD Oral pills	24(47%) 14(27%) 6(12%) 7(14%)
Age	16-20 21-25 26-30 31-35 36-40 41-45	2(4%) 19(37%) 17(33%) 8(16%) 2(4%) 3(6%)
Educational status	Islamiyya Primary Secondary Tertiary	19(37%) 9(18%) 16(31%) 7(14%)
Occupation	Employed Self-employed House wife	1(2%) 1(2%) 49(96%)
Tribe	Hausa Fulani Yoruba Nupe Igbo	34(67%) 12(23%) 2(4%) 1(2%) 2(4%)

Key: IUCD= intra uterine divice

Table 2: Comparison of haematological values (mean ± S.D) of test subjects and controls

Parameters	Test subjects n=51	Controls n=25	t- value	p- value
WBC (10^9/L)	7.48 ± 2.39	8.00 ± 4.03	-0.60	0.02*
LYMP (10^9/L)	2.92 ± 1.49	2.73 ± 0.83	-0.72	0.08
MID (10^9/L)	0.89 ± 0.44	0.97 ± 0.67	-0.53	0.16
NEUT (10^9/L)	3.66 ± 1.83	4.30 ± 3.43	-0.87	0.04*
RBC (10^{12}/L)	4.60 ± 0.60	4.77 ± 0.76	-1.00	0.25
HGB (g/dl)	11.52 ± 1.20	11.82 ± 1.52	-0.89	0.24
HCT (%)	34.96 ± 3.29	35.96 ± 4.39	-1.00	0.37
PLT (10^9/L)	335.52 ± 103.85	362.52 ± 139.58	-0.86	0.10
MPV (fL)	8.69 ± 0.75	8.88 ± 0.60	-1.24	0.47

PDW (%)	13.96 ± 0.97	14.76 ± 1.10	-3.07	0.62
PCT (%)	0.29 ± 0.07	0.32 ± 0.12	-1.26	0.02*
P-LCR (%)	21.90 ± 5.90	24.16 ± 4.91	-1.75	0.43

Key: *= significant, S.D= standard deviation, WBC= white blood cells count, LYMP= lymphocytes counts, MID= mixed cells counts, NEUT= Neutophils, RBC= red blood cells count, HGB= haemoglobin concentration, HCT= haematocrit, PLT= platelets count, MPV= mean platelets volume, PDW= platelets distribution weight, PCT= plateletcrits, P-LCR= platelets large cell ratio.

Table 3. Comparison of some haematological values (mean ± S.D) of test subjects on different methods of contraceptives

Parameters	Pills n=7	Injectable n= 14	IUCD n=6	Implant n=24	f-value	p- value
WBC (10^9/L)	7.58 ± 2.30	8.02 ± 2.34	6.88 ± 2.54	7.28 ± 2.49	0.41	0.75
LYMP(10^9/L)	3.33 ± 2.14	3.58 ± 2.10	2.62 ± 1.14	2.51 ± 0.66	1.84	0.15
MID (10^9/L)	0.93 ± 0.39	1.00 ± 0.57	0.90 ± 0.32	0.81 ± 0.41	0.54	0.66
NEUT(10^9/L)	3.32 ± 2.88	3.44 ± 1.20	3.37 ± 1.99	3.95 ± 1.87	0.38	0.77
RBC (10^{12}/L)	4.91 ± 1.05	4.66 ± 0.65	4.50 ± 0.20	4.51 ± 0.47	0.85	0.47
HGB (g/dl)	12.22± 0.86	11.67±1.23	11.15 ± 0.82	11.35 ±1.30	1.11	0.35
HCT (%)	36.43± 2.74	35.26±4.08	34.23 ± 2.07	34.60 ± 3.19	0.62	0.61
PLT (10^9/L)	431.50 ±232.78	347.29 ±67.73	325.83 ±62.33	307.08 ±66.36	2.62	0.62
MPV (fL)	8.40 ± 0.86	8.84 ± 0.83	8.83 ± 0.67	8.61 ± 0.71	0.63	0.60
PDW (%)	14.28 ±1.18	13.87±1.00	13.67 ± 1.32	14.01 ± 0.83	0.47	0.70
PCT (%)	0.35 ± 0.13	0.30 ± 0.05	0.29 ± 0.06	0.26 ± 0.05	2.88	0.04*
P-LCR (%)	20.25±6.27	22.92±6.80	23.30 ± 4.83	21.36 ± 5.68	0.45	0.71

Key: *= significant, S.D= standard deviation, IUCD= intra uterine device, WBC= white blood cells count, LYMP= lymphocytes counts, MID= mixed cells counts, NEUT= Neutrophil, RBC= red blood cells count, HGB= haemoglobin concentration, HCT= haematocrit, PLT= platelets count, MPV= mean platelets volume, PDW= platelets distribution weight, PCT= plateletcrits, P-LCR= platelets large cell ratio.

Table 4: Comparison of some haematological values (mean ± S.D) of test subjects based on age

Parameters	16-20 n=2	21-25 n=19	26-30 n=16	31-35 n=8	36-40 n=2	41-45 n=3	f-value	p- value
WBC (10^9/L)	5.57 ±2.05	7.33 ±2.51	8.11 ±2.11	8.06 ±2.85	6.00 ±1.41	5.70 ±1.61	1.09	0.38
LYMP(10^9/L)	2.00 ±0.42	2.86 ±1.48	2.88 ±1.13	3.82 ±2.30	2.20 ±0.99	2.17 ±0.32	1.00	0.43
MID (10^9/L)	0.55 ±0.35	0.87 ±0.48	0.93 ±0.46	0.97 ±0.56	0.95 ±0.35	0.80 ±0.46	0.32	0.90
NEUT (10^9/L)	3.00 ±1.27	3.60 ±2.06	4.29 ±1.93	3.28 ±1.51	2.85 ±0.78	2.73 ±0.87	0.72	0.61
RBC(10^{12}/L)	5.02 ±0.18	4.67 ±0.76	4.57 ±0.76	4.39 ±0.78	4.63 ±0.25	4.58 ±0.40	0.43	0.83
HGB(g/dl)	12.15 ±1.20	11.44 ±1.37	11.56 ±1.31	11.41 ±0.79	11.60 ±0.42	11.63 ±1.31	0.14	0.98
HCT (%)	36.50 ±1.98	34.96 ±3.62	35.41 ±2.90	33.36 ±3.32	34.85 ±1.48	35.97 ±5.17	0.56	0.73
PLT (10^9/L)	285.50 ±89.80	349.79 ±151.87	315.25 ±51.91	335.38 ±60.10	389.00 ±73.54	351.33 ±78.14	0.38	0.71
MPV (fL)	8.55 ±0.07	8.72 ±0.79	8.83 ±0.77	8.35 ±0.91	9.00 ±0.28	8.40 ±0.10	0.58	0.71
PDW (%)	14.20 ±0.28	14.07 ±1.01	13.96 ±0.98	14.05 ±1.17	13.65 ±0.50	13.03 ±0.12	0.66	0.66
PCT (%)	0.24 ±0.07	0.30 ±0.01	0.28 ±0.04	0.28 ±0.03	0.35 ±0.07	0.29 ±0.06	0.66	0.66
P-LCR(%)	20.60 ±0.85	22.24 ±6.31	22.94 ±6.20	19.89 ±6.77	23.80 ±2.26	19.17 ±1.17	0.46	0.80

Key:

*= significant, S.D= standard deviation, WBC= white blood cells count, LYMP= lymphocytes counts, MID= mixed cells counts, NEUT= neutrophil, RBC= red blood cells count, HGB= haemoglobin concentration, HCT= haematocrit, PLT= platelets count, MPV= mean platelets volume, PDW= platelets distribution weight, PCT= plateletcrits, P-LCR= platelets large cell ratio.

Table 5: Comparison of some haematological values (mean ± S.D) of test subjects based on educational status

Parameters	Primary n=9	Secondary n= 16	Tertiary n=7	Islamiyya n=19	f- value	p- value
WBC (10^9/L)	7.98 ± 2.15	7.52 ± 2.64	7.90 ± 1.83	7.02 ± 2.55	0.41	0.75
LYMP(10^9/L)	2.73 ± 0.96	2.99 ± 1.95	3.14 ± 1.06	2.87 ± 1.46	0.11	0.95
MID (10^9/L)	0.80 ± 0.30	0.91 ± 0.56	0.90 ± 0.35	0.92 ± 0.44	0.15	0.93
NEUT(10^9/L)	4.44 ± 1.76	3.63 ± 1.65	3.86 ± 1.97	3.23 ± 1.97	0.90	0.45
RBC (10^{12}/L)	4.62 ± 0.52	4.60 ± 0.44	4.59 ± 0.28	4.59 ± 0.83	0.00	1.00
HGB (g/dl)	11.27±1.04	11.33±1.19	11.84±0.91	11.69±1.40	0.54	0.66
HCT (%)	35.11±2.44	34.26 ± 2.47	36.29±2.15	35.00±4.50	0.62	0.61
PLT(10^9/L)	346.33±64.67	324.31±66.72	347.57±63.72	335.39±153.38	0.12	0.95
MPV (fL)	8.66±0.57	8.66±0.86	8.66±0.86	8.73±0.83	0.05	0.98
PDW (%)	13.45±0.60	13.81±0.83	13.81±0.83	14.19±1.16	1.78	0.16
PCT (%)	0.30±0.06	0.28±0.51	0.28±0.51	0.29±0.10	0.23	0.88
P-LCR (%)	21.03±4.35	21.86±6.74	21.86±6.74	22.53±6.58	0.14	0.94

Key:

*= significant, S.D= standard deviation, WBC= white blood cells count, LYMP= lymphocytes counts, MID= mixed cells counts, NEUT= neutrophil, RBC= red blood cells count, HGB= haemoglobin concentration, HCT= haematocrit, PLT= platelets count, MPV= mean platelets volume, PDW= platelets distribution weight, PCT= plateletcrits, P-LCR= platelets large cell ratio.

Table 6: Comparison of some haematological values (mean ± S.D) of test subjects based on occupation

Parameters	Employed n=1	Self-employed n=1	House wife n=49	f- value	p- value
WBC (10^9/L)	5.80	4.20	7.58±2.38	1.24	0.30
LYMP (10^9/L)	2.40	1.80	2.96±1.51	0.35	0.71
MID (10^9/L)	0.60	0.40	0.91±0.44	0.85	0.43
NEUT (10^9/L)	2.80	2.00	3.71±1.85	0.53	0.59
RBC (10^{12}/L)	4.71	4.33	4.60±0.60	0.12	0.89
HGB (g/dl)	11.30	10.40	11.55±1.21	0.46	0.64
HCT (%)	35.50	31.10	35.03±3.31	0.71	0.50
PLT (10^9/L)	369.00	262.00	336.35±105.38	0.30	0.75
MPV (fL)	8.60	8.50	8.68 ± 0.76	0.33	1.00
PDW (%)	15.5	13.10	13.95±0.96	1.71	0.19

PCT (%)	0.32	0.22	0.29±0.72	0.48	0.62
P-LCR (%)	22.50	20.50	21.92±6.02	0.03	1.00

Key:

*= significant, S.D= standard deviation, WBC= white blood cells count, LYMP= lymphocytes counts, MID= mixed cells counts, NEUT= Neutrophil, RBC= red blood cells count, HGB= haemoglobin concentration, HCT= haematocrit, PLT= pla telets count, MPV= mean platelets volume, PDW= platelets distribution weight, PCT= plateletcrits, P-LCR= platelets large cell ratio.

Table 7: Comparison of some haematological values (mean ± S.D) of test subjects based on tribe

Parameters	Hausa n=34	Fulani n=12	Yoruba n=2	Nupe n=1	Igbo n=2	f-value	p-value
WBC (10^9/L)	7.19 ± 2.24	7.77 ± 2.14	5.00 ± 1.13	13.70	9.80 ±1.27	3.44	0.02*
LYMP(10^9/L)	2.84 ± 1.36	2.65 ± 0.68	2.10 ± 0.42	9.10	3.65 ±1.48	7.01	0.00*
MID (10^9/L)	0.86 ± 0.40	0.98 ± 0.42	0.50 ± 0.14	2.20	0.60±0.28	3.59	0.01*
NEUT(10^9/L)	3.49 ± 1.75	4.13 ± 1.94	2.40 ± 0.57	2.40	5.55±3.04	1.17	0.34
RBC(10^{12}/L)	4.63 ± 0.63	4.46 ± 0.50	4.52 ± 0.27	5.70	4.50±0.21	1.06	0.39
HGB (g/dl)	11.68±1.23	11.18±1.20	10.85±0.64	10.20	12.25±0.21	1.03	0.40
HCT (%)	35.43±3.25	34.10±3.66	33.30±3.11	32.30	35.45±2.33	0.66	0.63
PLT(10^9/L)	342.15±116.35	309.17±71.61	315.50±75.66	462.00	341.00±80.61	0.60	0.67
MPV (fL)	8.73 ± 0.82	8.63 ± 0.42	8.55 ± 0.07	6.90	9.05 ±0.78	1.70	0.17
PDW (%)	13.87±0.91	14.05 ±1.00	14.30 ±1.70	13.00	15.00 ±1.56	0.97	10.43
PCT (%)	0.29 ± 0.77	0.27 ± 0.06	0.27 ± 0.07	0.32	0.31 ±0.45	0.39	0.81
P-LCR (%)	22.27±6.48	21.44 ±3.34	21.50 ±1.41	9.50	25.15 ± 7.57	1.34	0.27

Key:

*= significant, S.D= standard deviation, WBC= white blood cells count, LYMP= lymphocytes counts, MID= mixed cells counts, NEUT= Neutrophil, RBC= red blood cells count, HGB= haemoglobin concentration, HCT= haematocrit, PLT= platelets count, MPV= mean platelets volume, PDW= platelets distribution weight, PCT= plateletcrits, P-LCR= platelets large cell ratio.

Discussion

This study assessed some haematological parameters (total white blood cell count, lymphocyte counts, mixed cell counts, neutrophils, red blood cell count, Haemoglobin concentration, haematocrit, platelet count, mean platelet volume, platelet distribution weight, plateletcrits, and platelet large cell ratio) of different contraceptive groups (IUCD, implant, injectable, and oral pills).

There were significant decreases in total white cell count, neutrophil and platelet crits in

the subject when compared with the control group ($p< 0.05$), though still within the normal ranges. Most modern contraceptives are now associated with lowering the estrogen dose from >50 µg to 30 µg, which is used to increase the division and proliferation of hematopoietic stem cells (HSCs) and thus explains the lower counts recorded. This dose reduction is associated with significantly decreasing the risk of venous thrombosis and other blood-related disorders (14).

When the mean values of the lymphocyte counts, mixed cells count, red blood cells count, haemoglobin concentration, haematocrit, platelets count, mean platelets volume, platelets distribution weight, and platelets large cell ratio obtained from all the contraceptive user's groups were compared with the values obtained from apparently healthy women that are not on any birth control method of similar age range, it was found that lymphocytes counts, mixed cells count, red blood cells count, haemoglobin concentration, haematocrit, platelets count, mean platelets volume, platelets distribution weight, and platelets large cell ratio have no significant difference as all the $p\geq0.05$. This is in variance with the study by Talib et al. in Samawah City, Iraq, which reported that the Haemoglobin content and Iron showed clear increases in values in users of contraceptives compared with control groups (19). The lack of significant difference in red cell count and haematocrit agrees with the study in which PCV and RBC did not change to higher than normal values (19). This could be because of the lower sample size used in this study.

There was no significant difference in the platelet counts in the users of contraceptives when compared with the control group. This is in agreement with the findings of the effect of oral contraceptives on platelets in women at Jos, and found to be no statistically significant difference in the mean platelets value in the subject compared with the control group (20). However, this is in contradiction with the finding by Isaac and colleagues in Sokoto (12) and Babatunde and Olatunji in Ilorin, Kwara state (21), who assessed the effects of hormonal contraceptives on platelets in women in their respective study populations and found the platelets count were higher on those on contraceptives compared to the control. Previous studies have reported that there is an increase in the number of platelets among contraceptive users because of the fact that estrogen administration significantly increases the division and proliferation of hematopoietic stem cells (HSCs) in women during the reproductive years (22). The normal result recorded here might be attributable to the use of smaller sample sizes or the short duration of contraceptive usage, which might not have produced differences in these parameters

Though within normal reference ranges, but total leukocyte count is lower in IUCD group, followed by implant contraceptives, and oral pills contraceptives then higher in injectables contraceptive groups. This is in contrast with the study conducted by Jamil and colleagues in Karachi, Pakistan which stated that the total leukocyte count is high in IUCD group, followed by oral contraceptives, and injectables then lastly in implant contraceptive groups (13). The variation could be that Jamil worked on long term use whereas the study did not consider duration of usage. Similarly, the study showed that, there was no significant difference in all the other parameters among the four groups of contraceptive users as the p-value consistently remains ≥ 0.05 within the groups with the exception of plateletcrits which have a p-value of 0.04 which shows significant difference between the groups. In respect to the mean haemoglobin concentration among the four-contraceptive group, there is no significant difference. Though within normal reference ranges, but the mean haemoglobin

concentration is lower in IUCD users. This is in partial agreement with the finding of Jamil and colleagues (13) in Karachi, Pakistan in which they sated that, all the contraceptive groups used for the study showed the haemoglobin concentration within normal range except for IUCD that was below normal range. The possible reason for the decreased haemoglobin concentration in the intrauterine contraceptive device users was the increased vaginal blood loss which is often experienced by the subjects using IUCDs.

Age, educational status and occupation have no effect on the haematological parameters on women using contraceptives. However, this study shows that ethnicity (tribe) affect some haematological parameters of women on contraceptives, as the total white blood cells count, lymphocytes count and mix cells count have a p-value <0.05 which shows significant difference between women on contraceptives from different ethnic groups. This is in disagreement with the findings of Godsland (23) who analyze the effects of oral contraceptives on haematological indices of four ethnic groups (the blacks, whites, Indians and the Orientals) and found it not significant. They also assessed the effect of age and found it not significant. The reason for this variation could be because the large number of the participants from Hausa and Fulani tribe compared to other tribes.

Conclusion

This study found out significant decrease in neutrophils, total white blood cells count and plateletcrits of women on contraceptives than normal healthy women not on any form of contraception. This can lead to reduced immune system and exposure to infections.

Recommendations

There is need to monitor full blood count parameters of those on contraceptives to avoid adverse haematological effects such as reduced immune system and susceptibility to infections.

Study should be conducted with large sample size and long exposure to contraceptive to ascertain actual effect of contraceptive use on those doing family planning.

Conflict of Interest: The authors have declared no conflict of interest.

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